

Stress Cardiomyopathy Associated with Anesthesia

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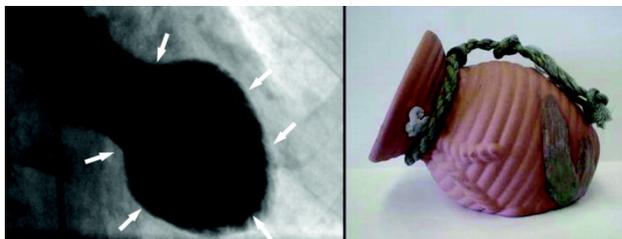
Abstract Takotsubo cardiomyopathy is one of the acquired cardiomyopathies which occurs due to physical or emotional stress. Its most common manifestations are chest pain, dyspnea but may be accompanied with myalgia, abdominal symptoms, palpitations syncope or presyncope. These symptoms can vary from mild to severe forms. It mimics myocardial infarction as greater than 80% of patients with takotsubo cardiomyopathy have ST segment elevation on electrocardiogram, followed by diffuse deep T-wave inversion and QT prolongation. Ventriculography often shows transient hypo kinesis of left ventricular apex but cardiac catheterization shows no coronary artery disease and it resolves completely within days to weeks. Electrocardiographic and echocardiographic disturbances are seen with reduced LVEF and normal angiography. In this report, we present a case of 67 years old lady who was scheduled for right breast lumpectomy and underwent stress cardiomyopathy due to anesthesia effects. Case description will further illustrate the patient, procedure and anesthetic management.

Keywords: *anesthesia, stress cardiomyopathy, takotsubo cardiomyopathy*

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1. Background/ Introduction

There are several proposed mechanisms to explain pathophysiology of takotsubo cardiomyopathy but catecholamine related cardiotoxicity during stress and microvascular dysfunction are the most important theories. Other pathophysiological mechanisms include microvascular coronary spasm, abnormal response to stress hormones especially epinephrine and norepinephrine. Takotsubo is a Japanese word meaning a pot for catching octopus. Heart appears just like this pot with a narrow neck and a wide base, on ventriculogram during takotsubo cardiomyopathy [1].



It's also known as broken heart syndrome, transient LV apical ballooning syndrome or stress induced cardiomyopathy [4]. Lack of estrogen, emotional or physical stress and genetic factors are known risk factors for developing takotsubo cardiomyopathy. Gender-related difference is because women have more potential epinephrine stores available for sudden release. In postmenopausal women, reduced estrogen levels alter endothelial function which makes them more prone to have sympathetic-mediated myocardial stunning [3]. The

most common associations which are seen in takotsubo patients are hypertension (13-80%), followed by hyperlipidemia (0-60%), diabetes mellitus (0-33%), smoking (0-50%), and a family history of cardiovascular disease (0-50%). It is important to recognize takotsubo cardiomyopathy because it mimics ST-segment elevation myocardial infarction [3].

2. Case Presentation

A 67-year-old woman diagnosed with ductal carcinoma of right breast presented for right breast lumpectomy and sentinel lymph node biopsy. Her past medical history included diet-controlled hypertension, and hyperlipidemia. She was not on any prior medication except multivitamins. She has no known drug allergies, no history of smoking, alcohol consumption, or other drug use. Mother has history of asthma and father has history of arthritis and esophageal cancer. Her preoperative ECG showed normal sinus rhythm with no specific changes. Her preoperative vitals were normal/stable. Her chest was clear to auscultation bilaterally, heart sounds were normal, and there was no JVD. No medications were in preoperative period. In the operating room, she was given paravertebral block at C7-T5 with 1% lidocaine and bupivacaine. After this, her heart rate started dropping off to 38/minute and her extremities were getting cooled. She was given two doses of atropine and robinul (glycopyrrolate) 0.4mg. Her heart rate kept decreasing until it became 20/minute, hypotensive and unresponsive. Patient was immediately intubated to protect airways using 2 mg midazolam and 100 mg of fentanyl. Patient was started on IV fluid and epinephrine drip. After intubation surgery was cancelled,

cardiology consult was requested and a temporary pacemaker was implanted. She was transferred to ICU for further management. In ICU, she went into PEA arrest with ROSC after two rounds of CPR and two doses of epinephrine and bicarbonate. Bedside Echo showed ejection fraction 10% with severe left ventricular akinesis. She was started on vasopressin and levophed. She had CT-chest with PE protocol that was negative for PE but showed pneumonia. Patient was given vancomycin and zosyn. Meanwhile cardiac catheterization showed angiographically normal coronary arteries. EKG showed paced rhythm and cardiac biomarkers were also elevated troponins 6.60, 6.81 and 7.35 ng/ml. Her next ECG showed paced rhythm with LVEF 10% on echo and impella catheter was implanted temporarily. After two days, her LVEF was improved to 20% and on third day it improved to 35-40 % and pacemaker as well as impella device were removed. Patient remained hemodynamically stable and was discharged from hospital.

3. Case Discussion

In takotsubo cardiomyopathy the most frequently affected part is apical wall of heart. The possible explanation for this fact is lack of a 3-layered myocardial configuration in apex. Hence it has limited elasticity and is prone to ischemia [3]. Furthermore, the apex is most sensitive part to adrenergic stimulation which occurs during stress. These facts might make the apex more reactive to catecholamine surge often seen in takotsubo cardiomyopathy. It mostly occurs in elderly post-menopausal women who undergo physical or emotional stress and it has favorable prognosis in most of the cases. Some important complications of TCM include hypotension, heart failure, ventricular rupture, torsade's de pointes and thrombosis involving left ventricular apex. In almost 5% of patients' biomarkers are not significantly elevated or at all, but there may be a slight increase in creatine kinase MB and troponins I and T, although at a lower level than acute myocardial infarction [3]. In 30% of the patient's catecholamine level is not elevated during acute phase but if it elevates it falls progressively /Slowly. Moreover, an acute phase reactant, C- reactive protein is elevated in 50% of patients and is associated with poor prognosis and increase mortality rate in takotsubo cardiomyopathy. Cardiac complication including cardiogenic shock, pulmonary edema, cardiac

death and cardiac arrest are seen in 15% of entire takotsubo patients but this is relatively small number in comparison to STEMI patients [6]. One recent report has shown that 55.8 % of takotsubo patients had a history or an acute episode of psychiatric or neurological disorder, and they are already on antidepressants medication [5]. Treatment is mainly given to control the symptoms; no long-term treatment is necessary.

4. Conclusion

Although any stressful situation can lead to stress induced cardiomyopathy but surgical events are an important cause for stress induced cardiomyopathy. Its identification, diagnosis and management is crucial to rule out MI and to prevent its dreadful complications.

Abbreviations

LV left ventricle, LVEF- left ventricular ejection fraction. ECG- electrocardiogram, STEMI- ST segment elevation myocardial infarction, JVD- jugular venous distension, PEA- pulseless electrical activity, ROSC- return of spontaneous circulation, CPR –cardiopulmonary resuscitation, TCM- takotsubo cardiomyopathy

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